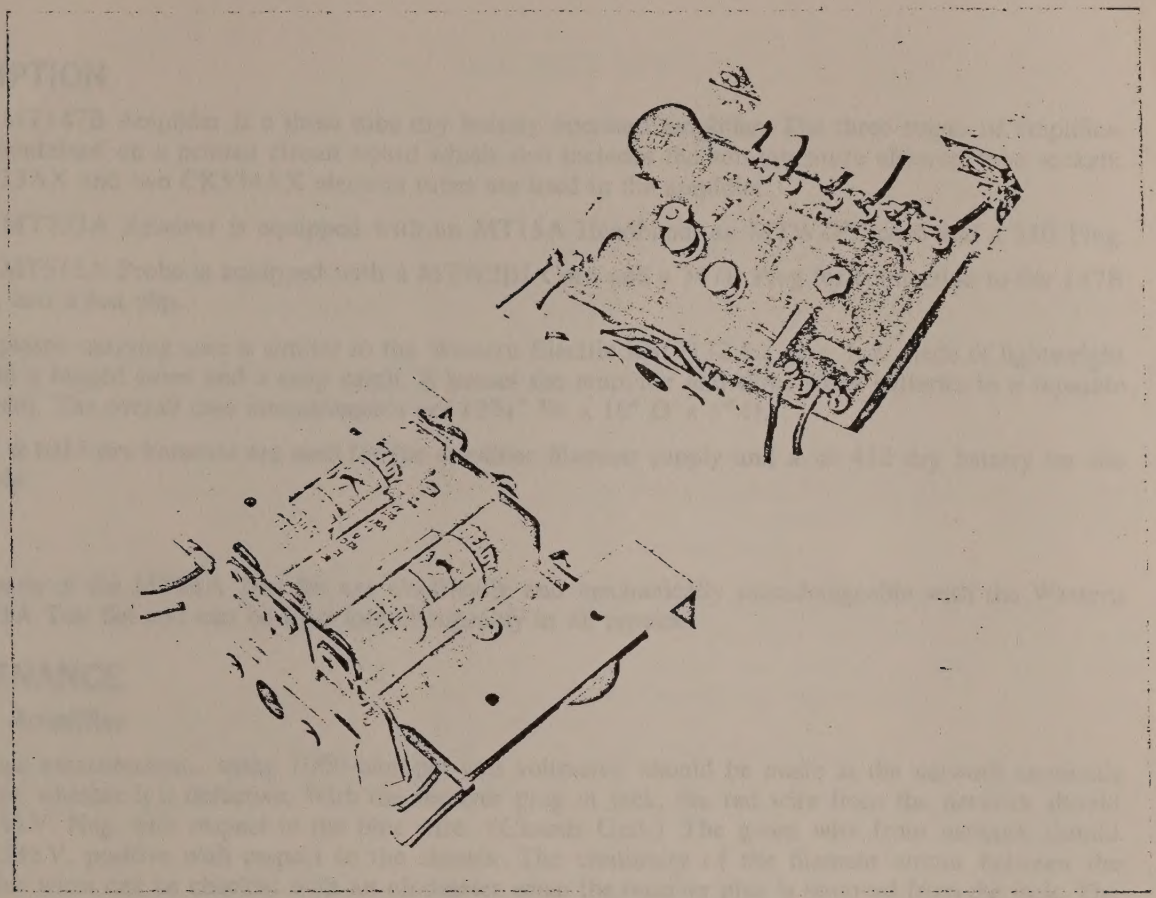
TEST EQUIPMENT

9-7-90

MODEL 1023 SOLID STATE AMPLIFIER KIT FOR 147 TYPE AMPLIFIERS

CONVERSION KIT



MODEL 1023 AMPLIFIER KIT

The Model 1023 is a solid state conversion kit designed to up-date all 147 type amplifiers to the current Model MT 147C. Conversions can be made in the field by following step by step instructions. This new circuit incorporates modern integrated circuitry for lower battery drain and increased sensitivity and removes the troublesome electron tubes and transformers.

FEATURES:

1. Three 1½ volt (#1015) batteries for a total battery life of 6000 hrs.
2. Replaces old loose molded battery holders and contacts with solid steel spring holders to withstand shock and vibration.
3. Incorporates a center frequency of 540 Hz for use with old and new detection frequencies (500 or 577Hz).
4. Improved band width response for elimination of outside interference.
5. Increased sensitivity for better fault detection.
6. Increased loudness for noisy locations.
7. Intergrated circuits provide low voltage, low current consumption.
8. Converts all model 147B amplifiers, (WE Co, Northern Electric or Metro Tel).

CAUTION
CHANGES HAVE BEEN MADE
ON THIS PAGE.
SEE ISSUE SHEET. 1/04/94

Metro Tel Corp

15 BURKE LANE, SYOSSET, NEW YORK 11791 • (516) 364-3377

TEST EQUIPMENT

DESCRIPTION

The MT147B Amplifier is a three tube dry battery operated amplifier. The three stages of amplifications are contained on a printed circuit board which also includes the sub-miniature electron tube sockets. One CK533AX and two CK534AX electron tubes are used in the amplifier.

The MT723A Receiver is equipped with an MT15A Headband, an MTW2FT cord and a 310 Plug.

The MT513A Probe is equipped with a MTW2BJ Cord and a 347B Plug for connection to the 147B Amplifier, and a test clip.

The plastic carrying case is similar to the Western Electric KS14132 L2 case. It is made of lightweight plastic with a hinged cover and a snap catch. It houses the amplifier and three spare batteries in a separate compartment. The overall case measurements are 12¾" W. x 10" D. x 5" H.

Two #1015 dry batteries are used for the amplifier filament supply and a # 412 dry battery for the plate supply.

NOTE

All parts of the MT91A Test Set are electrically and mechanically interchangeable with the Western Electric 91A Test Set and can be used interchangeably in all repairs.

MAINTENANCE

MT147B Amplifier

Voltage measurements, using 1000-ohm-per-volt voltmeter, should be made at the network terminals to determine whether it is defective. With the receiver plug in jack, the red wire from the network should measure 1½ V. Neg. with respect to the blue wire. (Chassis Gnd.) The green wire from network should measure 22½ V. positive with respect to the chassis. The continuity of the filament circuit between the red and blue wires can be checked with an ohmmeter when the receiver plug is removed from the jack. The resistance should measure between 30 and 65 ohms. The continuity of the wiring can also be tested with the ohmmeter. The low windings of both transformers have a resistance of about 5 ohms; the high windings are about 1200 ohms.

Batteries 412

The batteries are held in place in the MT147B-type amplifier by means of spring clips on the reverse side of the amplifier chassis. The filament and plate batteries should be discarded when their voltages reach 1.0 and 17.0 volts, respectively. The filament voltage should be measured with the battery in the amplifier and the receiver plug in the jack; the plate battery should be measured with the amplifier turned off.

Spare Parts List for 91A Test Set

MT147B	Amplifier	MT513A	Probe Assembly
A9890	Shoulder strap	A9894	Probe (tip and handle)
A9903	Carrying Case	MTW2BJ	Cord
B9906	Network	347B	Plug
CK533AX	Electron tube		
CK534AX	Electron tube	MT723A	Headset
412	Battery	MTW2FT	Cord
1015	Battery	310	Plug

41-0001 Flush mounting screw $2.50 ea 01/04/94

CAUTION
CHANGES HAVE BEEN MADE
ON
SEE ISSUE SHEET. 11/04/94

Metro Tel Corp
409 RAILROAD AVENUE, WESTBURY, NEW YORK

91A TEST SET

DESCRIPTION AND MAINTENANCE

1. GENERAL

1.01 This section describes the 91A Test Set used in cable testing and identifying.

1.02 It is reissued to show that the R2CF Cord has been replaced by the W2FT Cord and to delete circuit diagrams. The R2CF Cord will continue to be available as a replacement part as required.

1.03 The 91A set consists of a 147B Amplifier, a 723A Receiver, a 513A Tool (probe), cords and plugs in a ▶KS-14132 L2◀ Carrying Case. The 147B Amplifier is intended to facilitate testing and fault locating work with exploring coils and other testing apparatus where an amplifier is required. The amplifier with the 513A Tool is intended for identifying wires in toll and exchange cables without making metallic contact with the conductors at a splice or sheath opening.

1.04 Information on the use of the amplifier is covered in other sections.

2. DESCRIPTION

2.01 The 91A Test Set is illustrated in Fig. 1.

2.02 The 147B Amplifier shown in Fig. 2 is a three-tube dry battery operated amplifier. It is 4 inches by 4 inches by 1-1/2 inches and weighs about 1-1/4 pounds. The three stages of amplification are contained in a network, coded the KS-14556 Network. The network consists of a ceramic plate approximately 1-1/4 inch by 1-1/8 inches by 1/16 inches thick on which the resistors and conductors are printed and to which the subminiature electron tube sockets and disc-type capacitors are attached. One CK533AX and two CK534AX (Raytheon) electron tubes are used in the network.

2.03 The 147-type amplifier is equipped with a volume control calibrated from 0 to 100. The input and output jacks are labeled INPUT and REC, respectively.

2.04 Each 147-type amplifier is equipped with a carrying strap ▶and a belt clip.◀ Two studs are provided at each end of the amplifier for attaching the snap fasteners on the strap. The amplifier should be carried upside down on the strap ▶or belt clip◀ to prevent rain from entering the jack openings when the plugs are not inserted. The set is automatically turned on by inserting the headset plug.

2.05 Two KS-14368 Dry Batteries are used for the amplifier filament supply and a KS-14773 Dry Battery for the plate supply. These batteries must be ordered separately.

2.06 The 723A Receiver is equipped with a 15A Headband, a W2FT Cord and a 310 Plug. ▶The W2FT cord is a spring cord with a retracted length of 10 inches and a nominal usable length of 4 feet. The 528 or 716B receiver may be substituted for the 723A receiver.◀

2.07 The 513 Tool is equipped with a W2BJ Cord, a 347B Plug for connection to the 147B Amplifier, and a test clip.

2.08 ▶The KS-14132 L2 Carrying Case is a lightweight black plastic case with a hinged cover, a carrying handle on top, and a snap catch in front. Interior compartments along the front side of the case hold the amplifier and three spare batteries. The case measurements over the hardware are 13-1/4 inches by 8 inches by 6 inches.◀

3. USE WITH OTHER TEST SETS

3.01 ***101A, 105A, and 105C Test Sets (rated Manufacture Discontinued):*** With these test sets the switch of the amplifier should be set either at COIL or PROBE depending on which gives the better pickup.

© American Telephone and Telegraph Company, 1969
Printed in U.S.A.

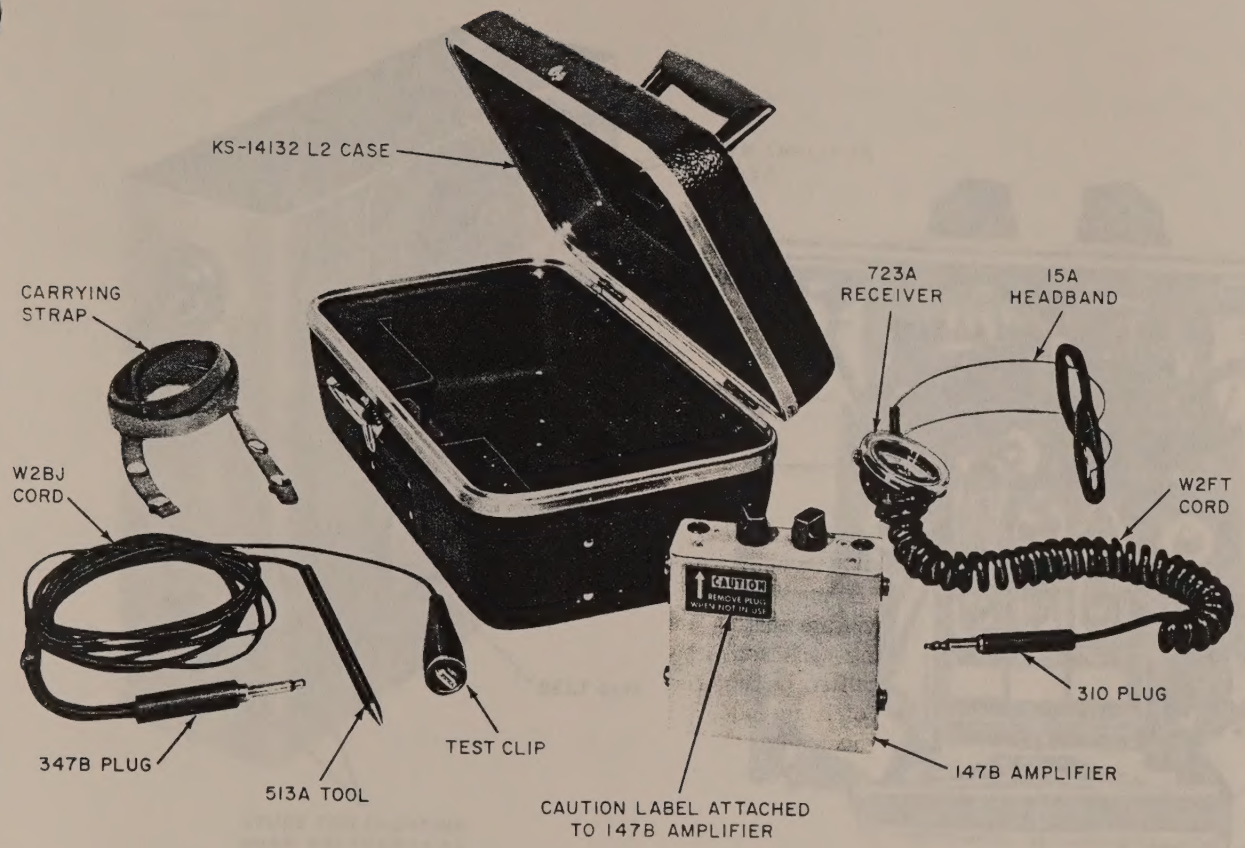


Fig. 1—91A Test Set

3.02 ***101B, 105B, and 105D Test Sets:*** With these sets the switch of the amplifier should be set at COIL.

3.03 ***79-Type Test Set:*** These sets can be used in the usual manner with the amplifier switch at COIL, for identifying battery wires and checking for power on coaxials.

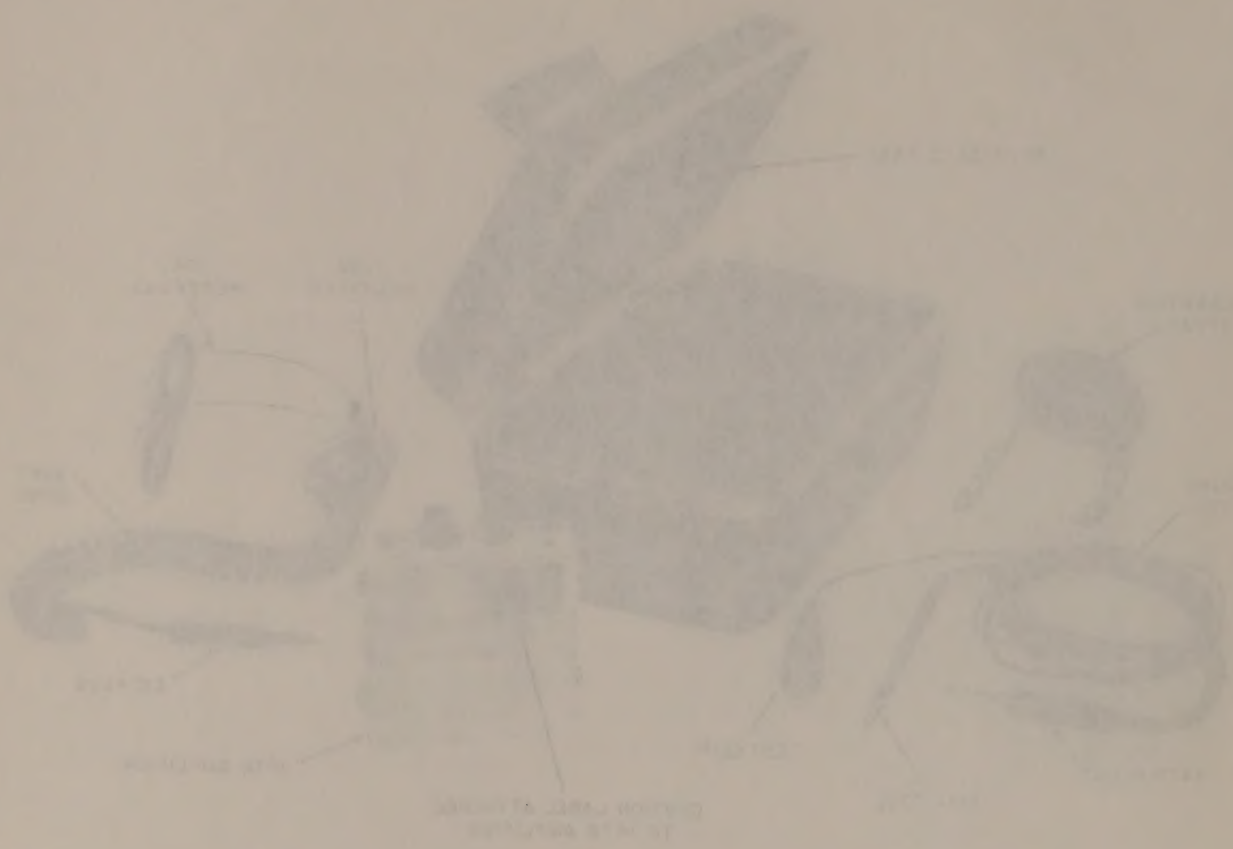
3.04 ***93-Type Test Sets:*** These sets can be used in the usual manner with the amplifier switch at PROBE, for determining the path and depth of buried conductors.

3.05 ***572B Tool:*** This is a magnetic type probe intended for wire identification at 300 kHz with the 71C or 115A Test Sets. The 572B Tool should be used with the amplifier switch set at COIL, to identify wires to which tone from the 72C or 116A Test Set has been applied. It is also useful in identifying wires that are grounded or crossed, as in the case of a total cable failure.

4. MAINTENANCE

147B Amplifier

4.01 Voltage measurements, using 1000-ohm-per-volt voltmeter, should be made at the network terminals to determine whether it is defective. With the receiver plug in the jack, Terminal 8 should measure 1-1/2 volts negative with respect to the chassis (Terminal 2); Terminals 4 and 5 should measure 22-1/2 volts positive with respect to the chassis. The continuity of the filament circuit between Terminals 2 and 8 can be checked with an ohmmeter when the receiver plug is removed from the jack. The resistance should measure



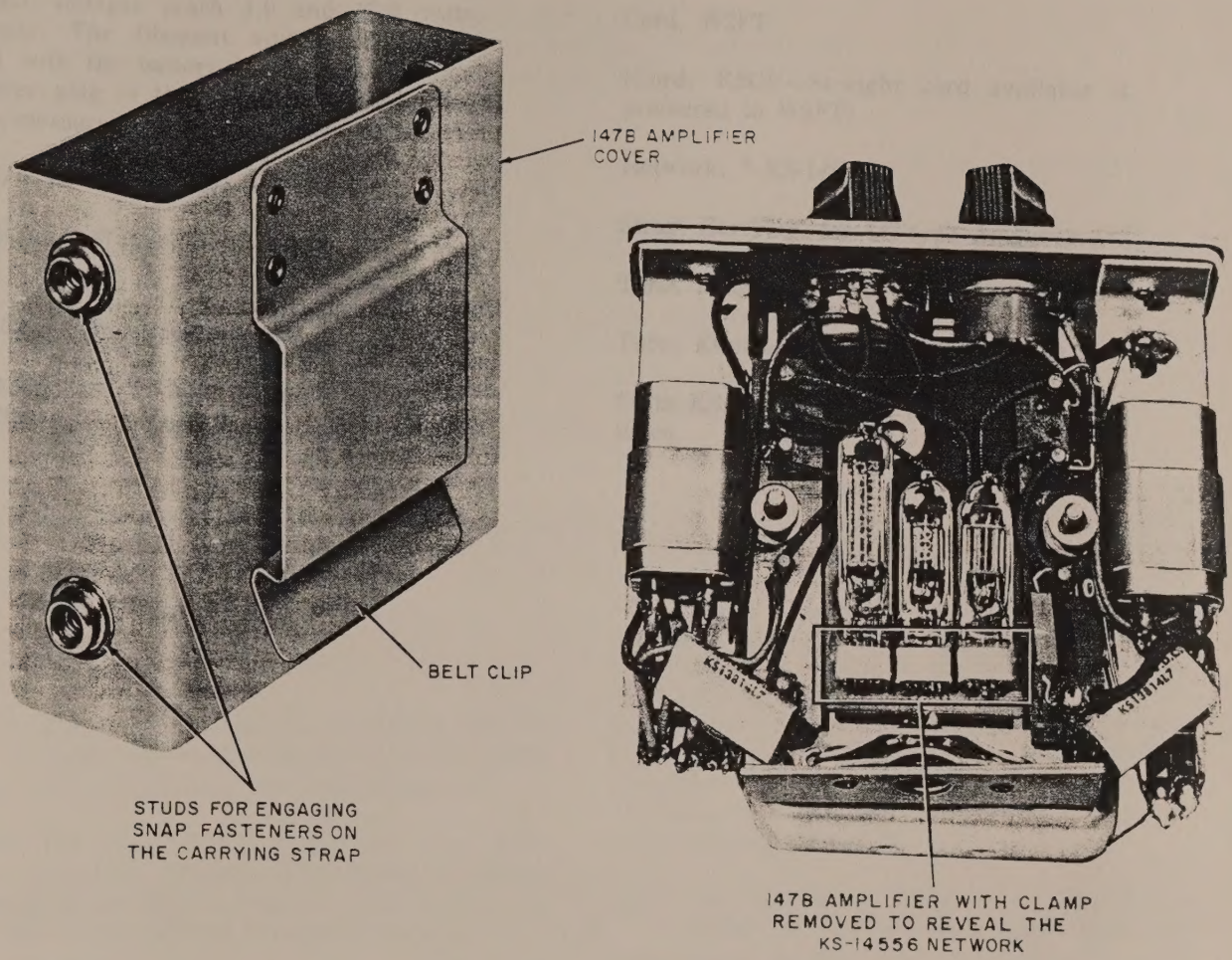

147B AMPLIFIER COVER
BELT CLIP
STUDS FOR ENGAGING SNAP FASTENERS ON THE CARRYING STRAP
147B AMPLIFIER WITH CLAMP REMOVED TO REVEAL THE KS-14556 NETWORK

Fig. 2—147B Amplifier

between 30 and 65 ohms. The continuity of the wiring can also be tested with the ohmmeter. The low windings of both transformers have a resistance of about 5 ohms; the high windings are about 1200 ohms.

4.02 A defective KS-14556 Network should be replaced as a unit. For this purpose the amplifier should be returned in accordance with local routine for making such repairs, or, if authorized, the network can be replaced in the field. To make the replacement, remove the amplifier from the case after turning the lock on the bottom, 1/4 turn counterclockwise. Then position the amplifier as shown in Fig. 2. The defective network should be removed by removing the clamp and unsoldering the seven wire leads from the terminals. The new network should be placed so that the bottom edge is in alignment with the location marks on the terminal strips. Cut the wire leads to the required length and sleeve them with No. 20 varnished tubing. Solder the leads to the same numbered terminals as the defective network without disturbing other solder connections. Insert the CK533AX tube in the left-hand socket and the two CK534AX tubes in the center and right-hand sockets. The red dot on the tubes should align with the red marking on the sockets. New tubes are equipped with 1-1/2 inch leads; these should be cut to 1/4 inch before the tube is placed in the socket. Then replace the clamp.

4.03 ***Batteries:*** The batteries are held in place in the 147-type amplifier by means of spring

clips on the reverse side of the amplifier chassis. The filament and plate batteries should be discarded when their voltages reach 1.0 and 17.0 volts, respectively. The filament voltage should be measured with the battery in the amplifier and the receiver plug in the jack; the plate battery should be measured with the amplifier turned off.

4.04 ***Parts for Field Replacements:***

Amplifier, 147-type

Battery, Dry, KS-14773 (Plate battery)

Battery, Dry, KS-14368 (2 required) (Filament battery)

Cord, W2BJ

Cord, W2FT

(Cord, R2CF—Straight cord available if preferred to W2FT)

Network, * KS-14556

Strap, Carrying, for 147-type Amplifier

Tube, Electron, CK533AX (1 required)

Tube, Electron, CK534AX (2 required)

* The KS-14556 Network is supplied without tubes.

WESTERN ELECTRIC
TYPE 147 AMPLIFIER AND ACCESSORIES
DESCRIPTION AND MAINTENANCE

CONTENTS PAGE

1. GENERAL 1

2. DESCRIPTION 1

Controls and Connectors 1
Accessories 5

3. USE WITH OTHER TEST SETS OR TOOLS 5

4. MAINTENANCE 5

Type 147A Amplifier 5
Type 147B Amplifier 7

1. GENERAL

1.01 This section is reissued to provide new and revised information pertaining to the WECo Type 147 Amplifier and associated accessories.

1.02 The Type 147B supersedes the Type 147A; however, information regarding the discontinued model 147A is retained in this section due to the quantity of these units still in field use.

1.03 Changes are indicated by marginal arrows. Remove Issue 1 of this section from the binder; replace with Issue 2.

2. DESCRIPTION

2.01 The Type 147 Amplifier (Figure 1) is used to facilitate testing and fault locating work with exploring coils and other testing apparatus where an amplifier is required. The amplifier with accessories (Figure 2) is intended for identifying wires in toll and exchange cables without making metallic contact with the conductors at a splice or sheath opening.

2.02 The Type 147 Amplifier cannot be used with the 78A Test Set because it does not have sufficient gain at 20 Hz, the frequency of the tracing current used with the 78A set. An existing 107A Amplifier should be used with the 78A.

2.03 The Type 147 Amplifiers are equipped with a strap and a belt clip for carrying purposes. Amplifiers can be operated in the carrying case or outside. There are two studs at each end of the amplifier to which the snap fasteners on the belt clip and strap are engaged. The amplifier can be carried upside down on the strap or in the belt clip to prevent rain entering the jack openings when the plugs are not inserted.

2.04 The 147B Amplifier is a three-tube, dry-battery-operated amplifier. It is 4 inches by 4 inches by 1-1/2 inches in size and weighs about 1-1/4 pounds. The three stages of amplification are contained in a network coded KS-14556 Network. The network consists of a 1/16-inch thick ceramic plate approximately 1-1/4 inches by 1-1/4 inches by 1-1/8 inches in size, on which the resistors and conductors are printed and to which the subminiature electron tube sockets and disc type capacitors are attached. One CK533AX and two CK534AK (Raytheon) electron tubes are used in the network. The network is indicated by the dotted lines in the circuit diagram (Figure 3).

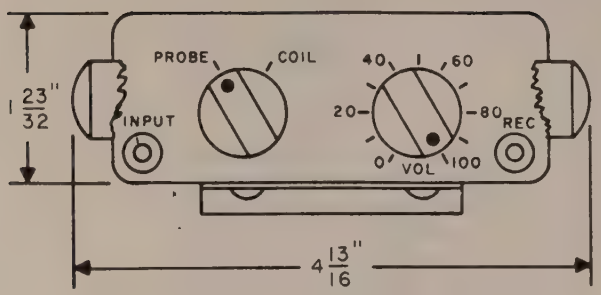
2.05 The superseded Type 147A Amplifier is similar in size, external appearance, and performance to the Type 147B Amplifier. The network in the amplifier formerly coded as the 703B Network and now designated as the KS-14541 Network consists of three electron tubes plus resistors and capacitors wired together and cast in a block of wax. The network is indicated by the dotted lines in the circuit diagram (Figure 4). If a defect develops in the network (703B or KS-14541), the complete amplifier must be returned to the maintenance shop for repair in accordance with local maintenance procedures.

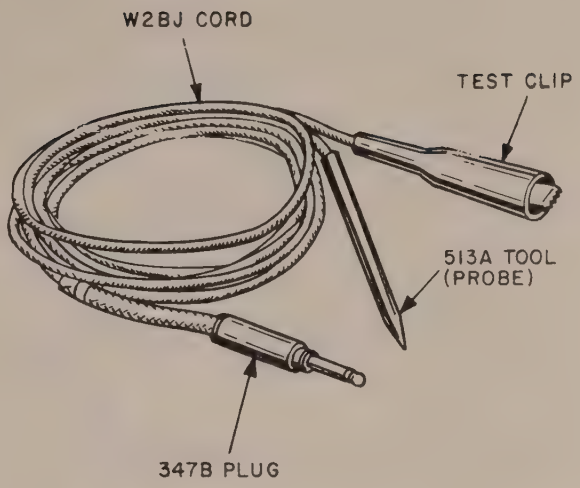
2.06 Information on the use of the amplifier is covered in other sections.

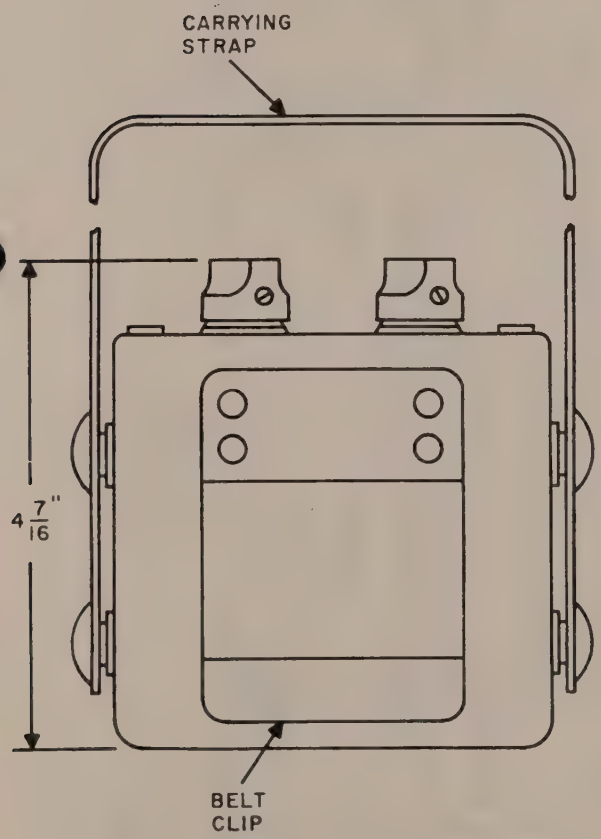
Controls and Connectors

2.07 The Type 147 Amplifiers are equipped with a gain control, labeled VOL, calibrated from 0 to 100. The switch labeled PROBE and COIL switches control P1, which is a conventional

THIS DOCUMENT IS PROVIDED WITH THE UNDERSTANDING THAT THE DOCUMENT OR ANY PORTION THEREOF IS NOT TO BE COPIED OR REPRODUCED UNLESS PRIOR WRITTEN PERMISSION IS RECEIVED FROM GTE SERVICE CORPORATION







→ Figure 1. Type 147 Amplifier.

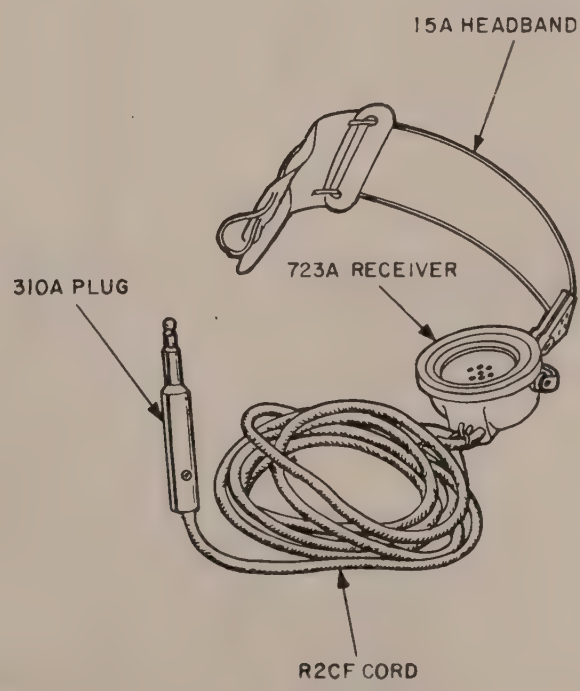


Figure 2. Type 147 Amplifier - Basic Accessories.

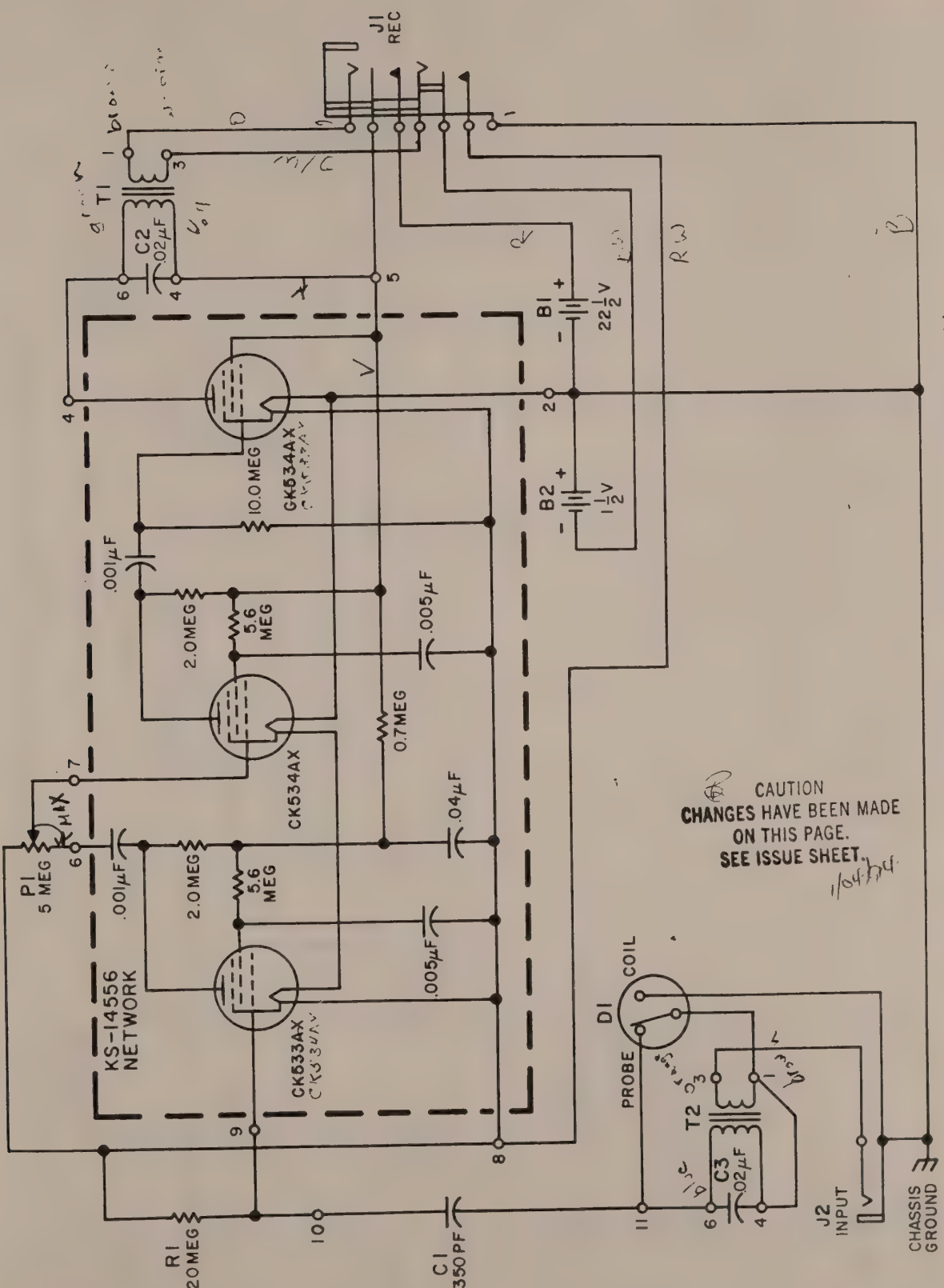
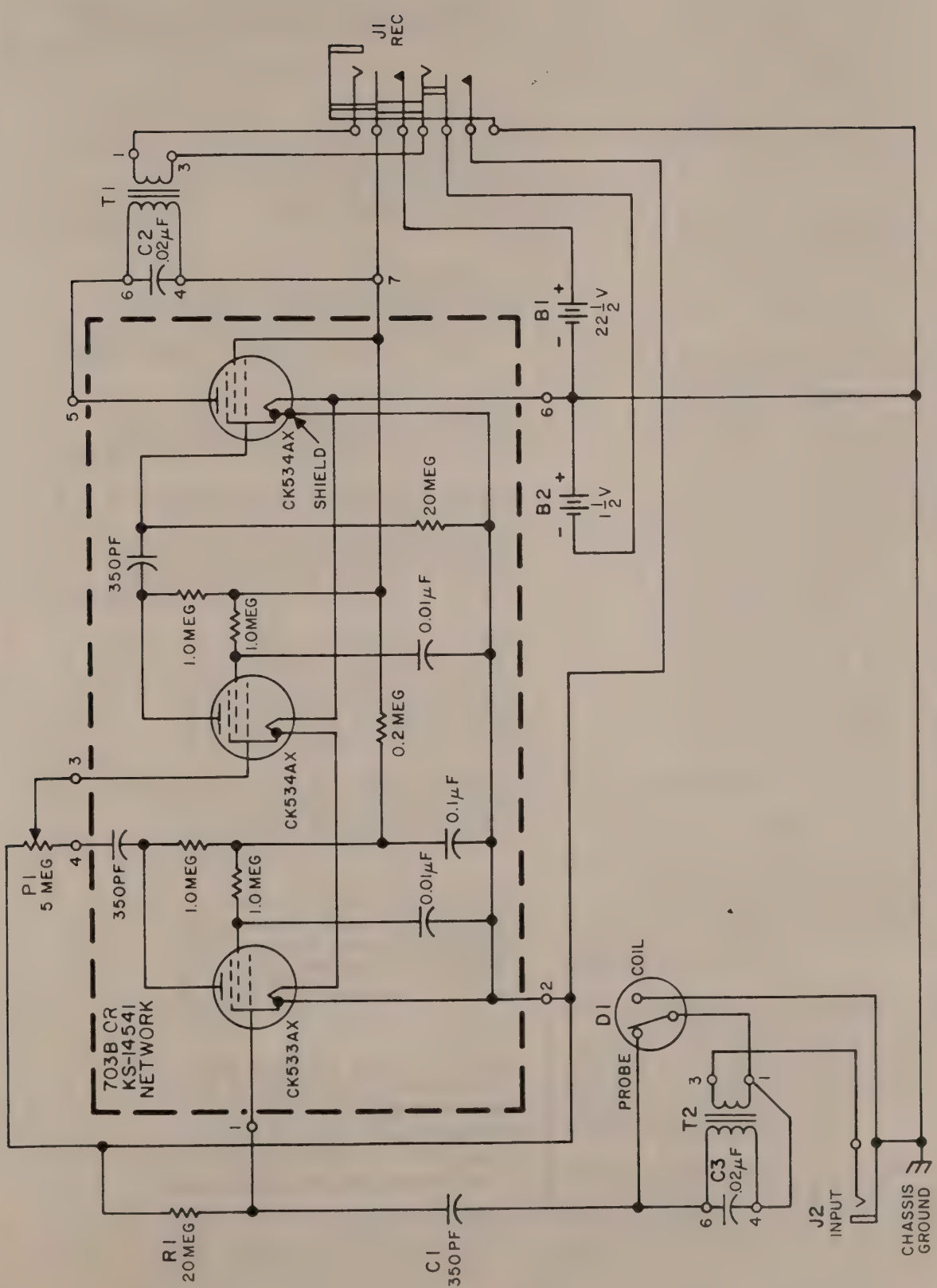


Figure 3. Type 147B Amplifier Circuit Diagram - KS-14556 Network).



→ Figure 4. Type 147A Amplifier Circuit Diagram - (Manufacture Discontinued).

voltage divider in the signal path of the amplifier. The input and output jacks are labeled INPUT and REC, respectively.

Accessories

2.08 Two 1-1/2 volt NEDA No. 15 Dry Batteries are used for the filament supply and a 22-1/2 volt NEDA No. 215 Dry Battery for the plate supply. These batteries must be ordered separately.

2.09 The WECo 723A Receiver (Figure 2) is equipped with a 15A Headband, an R2CF Cord, and a 310A Plug. The 528 and 716B Receivers can also be used.

2.10 The WECo 513A Tool (PROBE) is equipped with a W2BJ Cord, a 347B Plug and test clip (Figure 2).

3. USE WITH OTHER TEST SETS OR TOOLS

3.01 The Type 147 Amplifier and accessories are designed to be used in conjunction with the following test sets:

(a) WECo 101A and 105A Test Sets (Exploring Coils): With these test sets the switch of the amplifier should be set to either COIL or PROBE depending on which gives the better pickup.

(b) WECo 101B and 105B Test Sets (Exploring Coils): With these sets the switch of the amplifier should be set to COIL.

(c) WECo 93A Test Set (Exploring Coil, Buried Plant): This set is used in the usual manner with the amplifier switch set to PROBE for determining the path and depth of buried conductors.

(d) PR810 Exploring Coil: This unit is used in conjunction with the 147 amplifier to locate cable faults. When used, the amplifier switch should be set to either PROBE or COIL depending on which gives the better signal.

(e) WECo 572A Tool: This is a magnetic type probe intended for wire identification at 250 kHz with the 71A and 72A Test Sets. The 572A Tool should be used with the amplifier switch set to COIL to identify wires to which tone from the 76-type set has been applied. It is useful in identifying wires that are grounded or crossed, as in the case of a total cable failure.

(f) KMT No. 700011-000-001 or equal (Figure 5): Amplifier probe used with the Type 147 Amplifier for pair identification when using the tone-on amplifier-search method.

(g) PR600T Cable Kit (Figure 6): This kit consists of a 21-foot telescopic fiberglass pole equipped with a 27-foot shielded cord, a 5-foot cord, an exploring coil equipped with a jack for the pole top plug-jack adapter, and protective plugs for the pole top. This unit is to be used with the Type 147 Amplifier in locating shorts, crosses, and grounds, or with the LP400 or PR300 leak detector to locate leaks in pressurized cable. It may be used as a hand unit (5-foot cord) or as a ground-aerial unit by using the telescopic pole and exploring coil. Return the fiberglass pole to the storeroom annually for electrical (dielectric) tests.

4. MAINTENANCE

Type 147A Amplifier

4.01 Voltage measurements of the Type 147A Amplifier should be made using a 1000-ohm-per-volt voltmeter. The test should be made at the network terminals to determine whether the network is defective.

4.02 With the WECo 723A Receiver cord plug in the amplifier REC jack, terminal 2 should measure 1-1/2 volts negative with respect to terminal 6 (chassis ground); terminals 5 and 7 should measure 22-1/2 volts positive with respect to terminal 6 (chassis ground).

4.03 The continuity of the filament circuit between terminals 2 and 6 can be checked with an ohmmeter when the WECo 723A Receiver plug is moved from the REC jack of the amplifier.

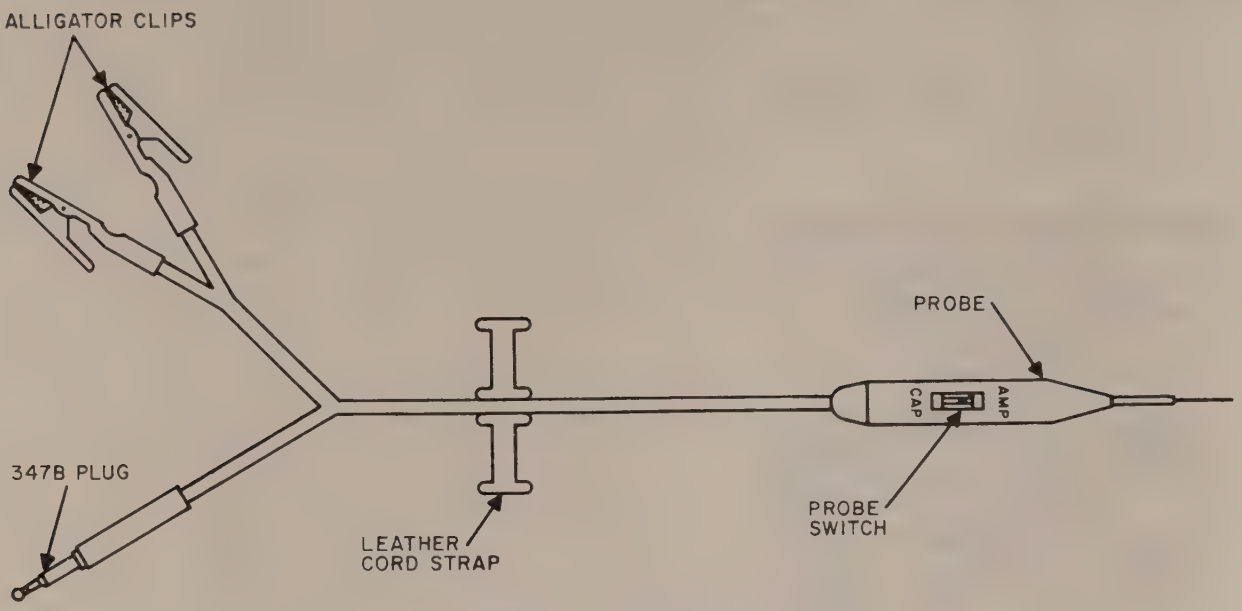


Figure 5a. Pictorial Diagram.

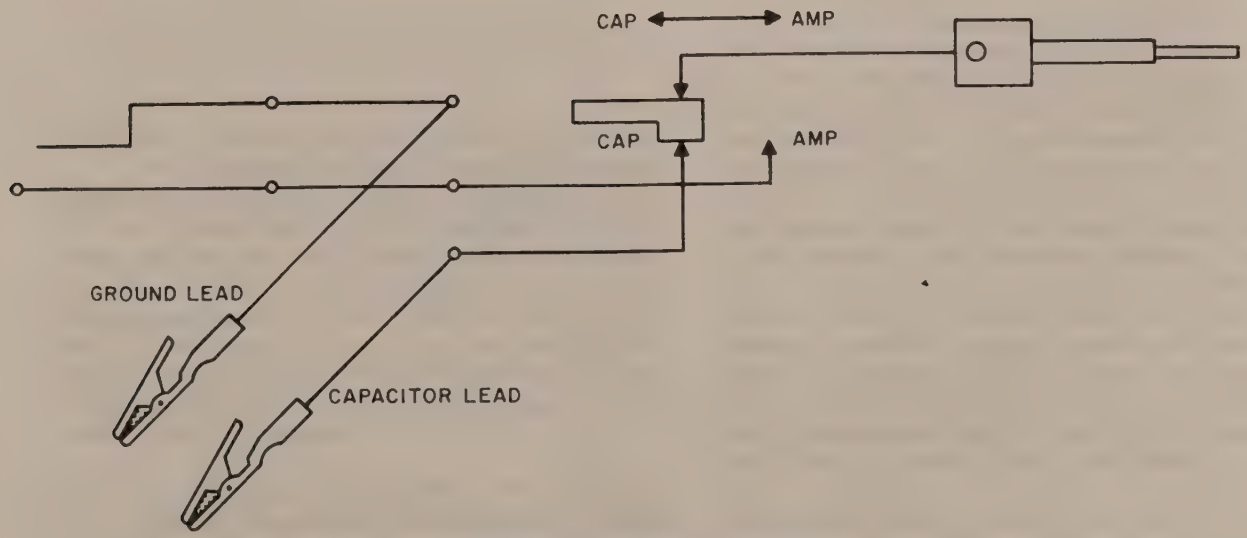
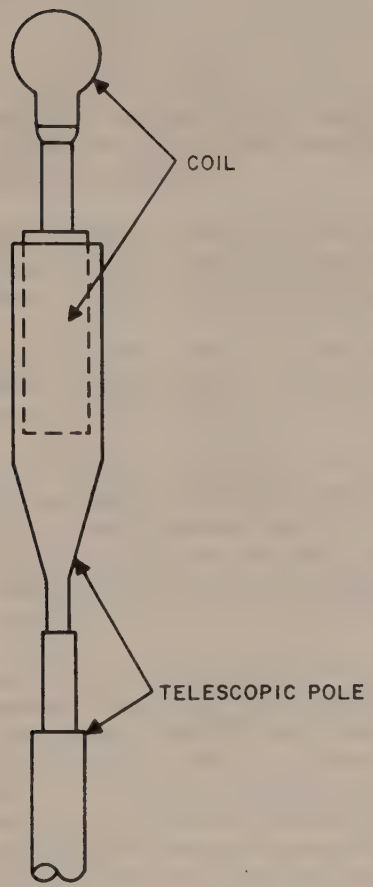


Figure 5b. Schematic Diagram.

→ Figure 5. Continuity Probe (KMT Corp.).

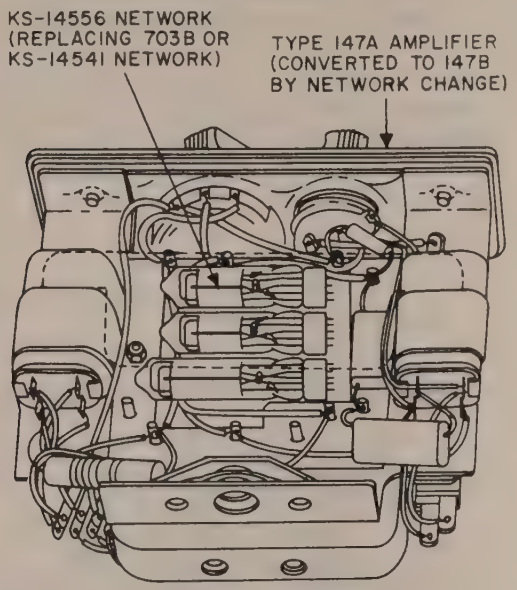


→Figure 6. Exploring Coil - PR600T Cable Kit.

4.04 The resistance between filament terminals 2 and 6 should measure between 5 and 20 ohms for amplifiers having the 703B network and 30 to 65 ohms for amplifiers using the KS-14541 network. The ohmmeter should also be used to test the continuity of the transformer windings. The transformer low windings (terminals 1 and 3 of T1 and T2) will read 5 ohms; the high windings of transformers T1 and T2 are measured across terminals 4 and 6. The high windings should have a resistance of 1200 ohms.

4.05 A defective 703B or KS-14541 network (Figure 4) cannot be repaired. When a Type 147A Amplifier requires maintenance of the network, it must be returned to the repair depot for handling in accordance with local procedures.

4.06 A defective 703B or KS-14541 network should be replaced with a KS-14556 network (Figure 7). This will convert the obsolete Type 147A to the Type 147B. All future tests will be the same as for the Type 147B.



→Figure 7. Type 147A Amplifier - KS-14556 Network Installed.

Type 147B Amplifier

4.07 Voltage measurements, using a 1000-ohm-per-volt voltmeter, should be made at the network terminals to determine whether it is defective. With the receiver plug in the jack, terminal 8 (Figure 3) should measure 1-1/2 volts negative with respect to the chassis (terminal 2); terminals 4 and 5 should measure 22-1/2 volts positive with respect to the chassis. The continuity of the filament circuit between terminals 2 and 8 can be checked with the ohmmeter when the receiver plug is removed from the jack. The resistance should measure between 30 and 65 ohms. The continuity of the wiring can also be tested with the ohmmeter. The low windings of both transformers have a resistance of about 5 ohms, the high windings about 1200 ohms.

4.08 A defective KS-14556 network (Figure 3) should be replaced as a unit. For this purpose the amplifier should be returned for handling in accordance with local routine. If authorized, the network can be replaced in the field. To make the replacement, proceed as follows:

(1) To remove a defective network, remove the retaining clamp and unsolder the seven wire leads from their terminal connections.

(2) Place the new network so that the bottom edge is in alignment with the location marks on the terminal strips.

(3) Trim the wire leads of the new network to the desired length for connection to the terminals.

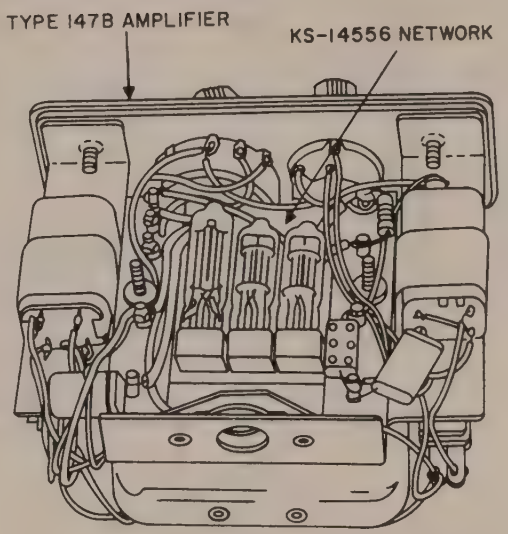
(4) Sleeve the seven leads with number 20 varnished tubing, and solder the leads to the same numbered terminals as those the defective network were soldered to, taking care not to disturb any of the other soldered connections.

(5) Insert the CK533AX subminiature electron tube into the left-hand socket. Insert one of the number CK534AX subminiature electron tubes in the center socket and the other in the right-hand socket. The red dot on the electron tubes should align with the red marking on the sockets.

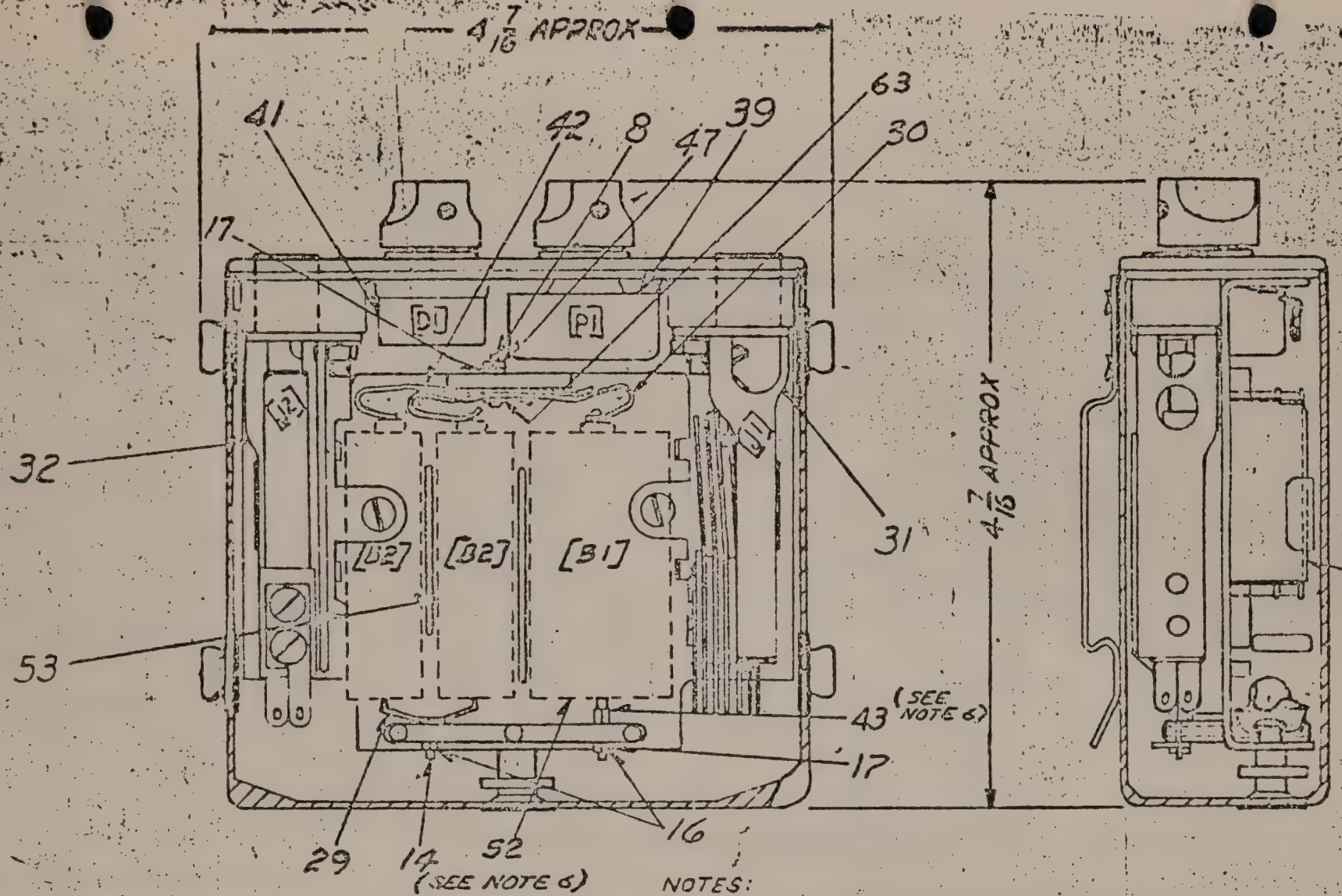
NOTE: New replacement subminiature tubes are equipped with 1-1/2 inch wire leads, which should be cut to a length of 1/4 inch before the tube is inserted into the socket.

(6) With all leads soldered and tubes inserted in the sockets, the replacement of the defective network is complete.

(7) Replace the retaining clamp removed in (1). Figure 8 shows completed replacement.



→Figure 8. Type 147B Amplifier - KS-14556 Network Installed.

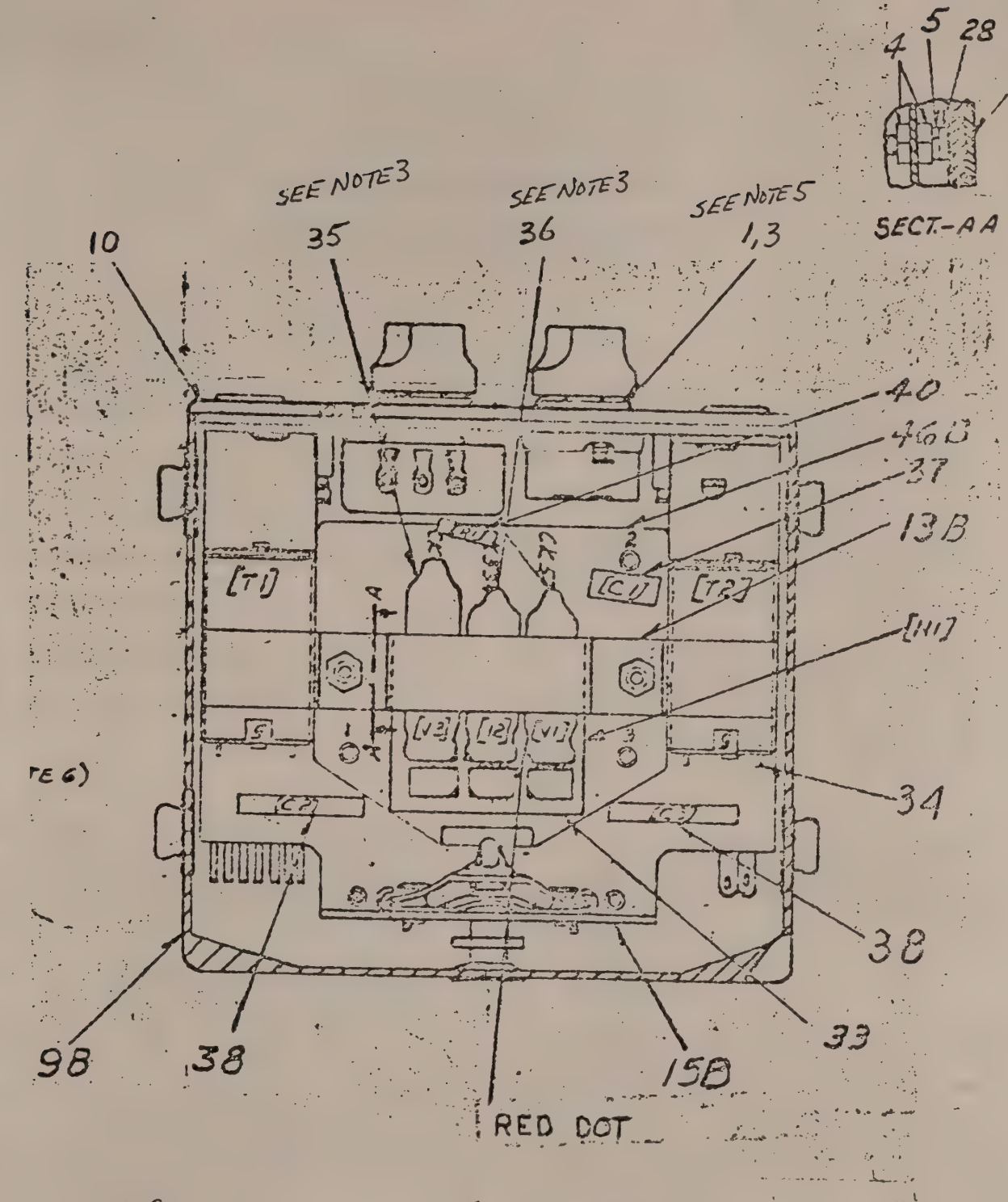


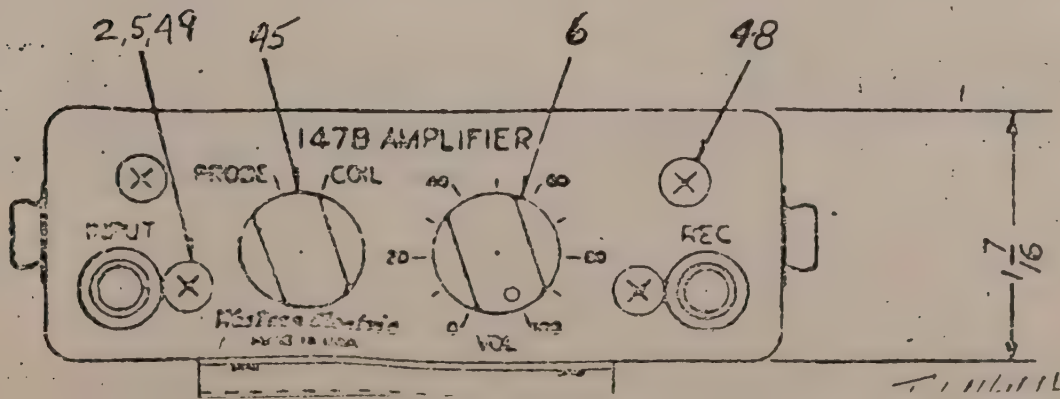
NOTES:

1. APPARATUS DESIGNATIONS C1, D1, J1, ETC. ARE FOR REFERENCE ONLY.
2. USE ITEMS 1 & 2 INSTEAD OF NUTS & WASHERS FURNISHED WITH THE POTENTIOMETER, ITEM 39, AND SWITCH, ITEM 41.
3. PURCHASE ORDER SHALL CALL FOR LEADS OF TUBES TO BE CUT TO .200 ± .015 LENGTH BY THE

5. ABOUT HALF OF NUT, ITEM-1 MAY BE EXPOSED.
6. ADD ≈ 1201 GLYPTAL TO THREADS OF ITEMS 14 & 43 AFTER NUTS ARE IN PLACE. ALSO ADD DROP OF ≈ 1201 GLYPTAL BETWEEN SHIELD AND TRANSFORMER OF ITEM 34.

147B Amp. T. 10444 SH 2 of 2


4
5
28
12
SECT-AA
SEE NOTE 3
SEE NOTE 3
SEE NOTE 5
10
35
36
1,3
40
46B
37
13B
[H1]
34
38
33
15B
98
38
RED DOT
[T1]
[C1]
[T2]
[V3]
[I2]
[V1]
[C2]
[C3]
RE 6)


2,5,49
45
6
48
1478 AMPLIFIER
PROBE
COIL
INPUT
REC
20
∞
1 7/16

Sh 4 of 4

MT-91A TEST SET AND

MT-101B, MT-105D EXPLORING COILS

GENERAL DESCRIPTION, USE AND MAINTENANCE

CONTENTS PAGE

1. GENERAL..... 1

2. DESCRIPTION..... 1

3. OPERATION WITH 105D OR 101B..... 3

4. OPERATION WITH 513A..... 5

5. MAINTENANCE & TESTING..... 6

6. SPECIFICATIONS..... 6

7. ASSOCIATED EQUIPMENT..... 7

8. ADDITIONAL INFORMATION..... 7

1. GENERAL

1.01 The MT-91A consists of an MT-147C amplifier, an MT-723A receiver, an MT-513A probe, cords and plugs for above in a plastic reinforced carrying case. (See Fig. 1)

1.02 The carrying case provides room for extra equipment as an MT-101B (hand exploring coil), and may hold spare batteries. (See Fig. 2)

1.03 The MT-147C amplifier is intended to facilitate testing and fault locating work with exploring coils and other testing apparatus where an amplifier is required.

1.04 The MT-147C amplifier with the MT-513A probe is intended for identifying wires in toll and exchange cables without making metallic contact with the conductors at a splice or sheath opening.

1.05 The MT-723A receiver is a headset which permits the operator to monitor the audible output of the MT-147C.

1.06 A carrying strap is supplied with the MT-91A for operation of the MT-147C when the operator so desires to carry the amplifier. Additionally, a belt clip is located on the MT-147C.

1.07 The MT-147C amplifier is a solid state amplifier intended to replace the W.E.CO. 147A or 147B and 147C. The MT-147C is different than the older 147 series, in that it uses integrated components and has extremely long battery life.

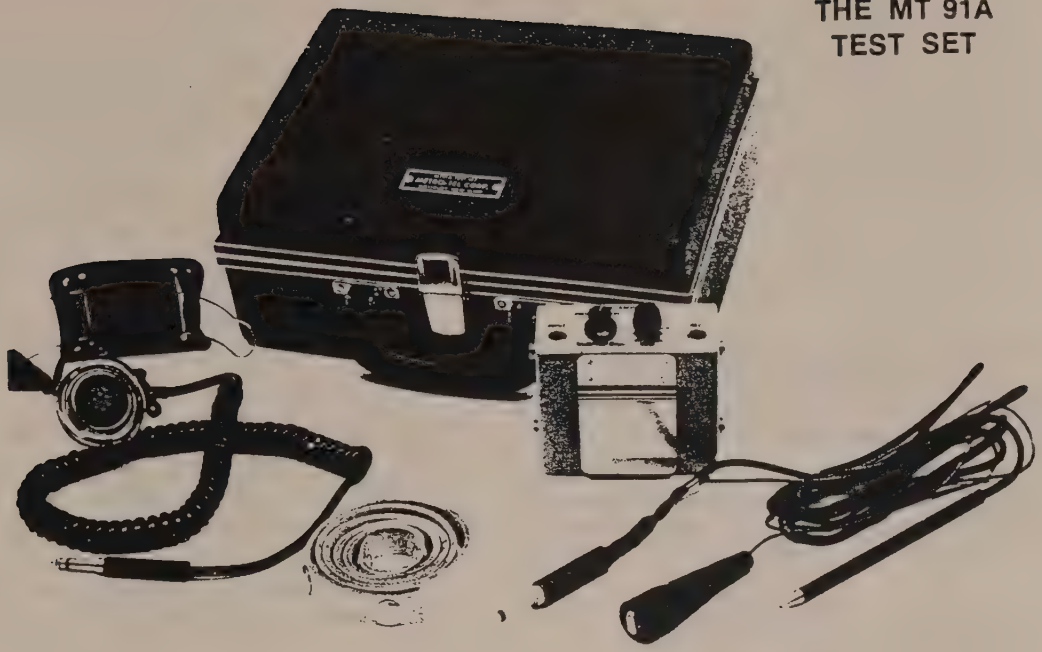
1.08 The normal application with fault finding work is with an MT-105D exploring coil in conjunction with an MT-14103 breakdown set or an MT-76C test set. (See Fig. 3)

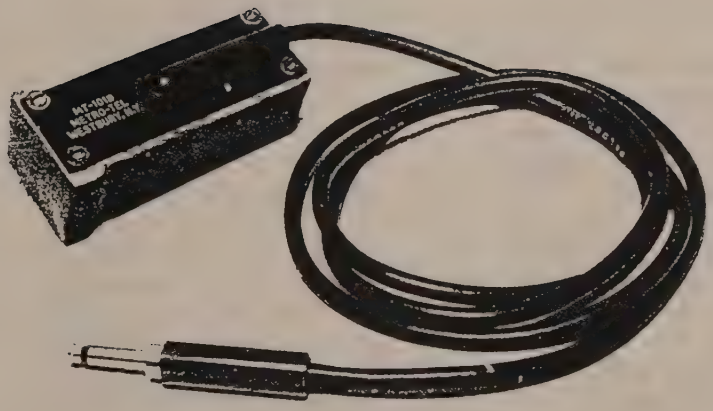
2. DESCRIPTION

2.01 The MT-147C is a direct replacement for all 147 series amplifiers with the latest technology. It provides enough gain to raise the smallest of signals to audible levels. It rejects most unwanted frequencies, such as high level 60 HZ power line signals.

2.02 The MT-147C has input and output jacks to accept the MT-723A receiver, MT-513A probe, MT-101B, or MT-105D exploring coils.

THE MT 91A
TEST SET





MT-101B
HAND EXPLORING COIL

MODEL
MT-105D
EXPLORING
COIL

2.03 The MT-147C has a mode switch (PROBE/COIL) for accepting corresponding devices.

2.04 The MT-147C has a calibrated volume control for adjustment to the operator's needs.

2.05 The MT-147C uses 3 ea. standard "AA" batteries that are commonly available.

2.06 The MT-723A receiver is a headset placed on the operator's head for monitoring the output of the MT-147C. The level of tones received may be adjusted by the volume control on the MT-147C for the operator's comfort. By interpreting the tones received, a fault (after breakdown) may be located. See OPERATION.

2.07 The MT-513A probe is plugged into the input jack of the MT-147C amplifier, and is used for detection of tone on wire pairs without making metallic contact.

2.08 The MT-101B and MT-105D are magnetic coil assemblies used for tracing tones through aerial cables. The devices pick up tones by proximity induction, and the signals are placed into the input jack of the MT-147C.

2.09 The MT-105D consists of an MT-101B exploring coil mounted at the end of a six-foot fiberglass extension pole. This coil is highly insulated to withstand 10,000 volts RMS and utilizes a flexible section to permit positioning the coil in relation to the cable being tested. The coil comes equipped with an MT-W3AM cord terminated by a 347B plug. It also contains a hook for hanging the test set on a strand or cable.

2.10 The MT-101B is used for tracing tones in C.O. cables or other cables when an extension pole is not required. The MT-101B consists, essentially, of a low impedance exploring coil enclosed in a cast resin block. It employs a six foot insulated cord equipped with a 347B plug. The cord is molded permanently into the coil.

3. OPERATION WITH MT-105D OR MT-101B

3.01 FAULT FINDING: After the suspected cable has been "broken down" by means of an MT-14103 test set, it is assumed a short circuit or weld exsists where a leakage path had been. When the above condition is established, tones may be placed on the "broken down" pair and traced to the weld in the following way.

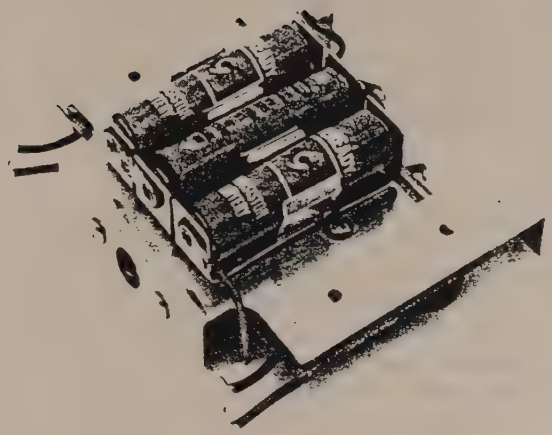
3.02 Using an MT-14103 series test set or an MT-76C to place 500 HZ tone on the defective pair, the operator may disclose where tones "disappear".

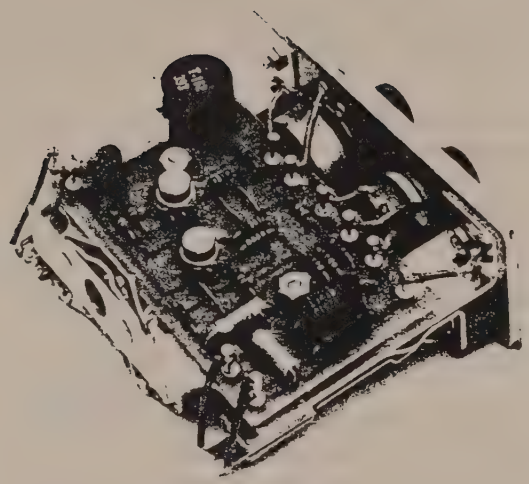
3.03 Connect the MT-101B or MT-105D coil to the input jack of the MT-147C amplifier.

3.04 Connect the MT-723A headset to the output jack on the MT-147C. This action also turns on battery power to the MT-147C through the interlocking jack.

3.05 The operator may then locate the equipment on his belt and posistion the headset for comfortable listening.
NOTE: If the operator has a need for not wearing the MT-723A headset, the MT-7888 loudspeaker set may be used in place of the MT-723A. A two foot 310 to 310 jumper cord is required for connection. (See Fig. 6)

3.06 The operator should then verify an operational system by turning on his tone source; i.e., an MT-14103 or MT-76C. By placing the MT-101B or MT-105D next to the output wires of the tone source, tone should be heard in the headset or loudspeaker set. The operator should then adjust the volume controls for comfortable listening levels.





MT 7888 TEST SET

3.07 The tone source should then be placed onto the defective lines, and the operator should again verify audible pick up via the 91A arrangement.
NOTE: Make sure that the MT-147C amplifier is in "coil" mode when using the MT-101B or MT-105D magnetic pick-up coils.

3.08 If cable is aerial, using the MT-105D, the operator should start walking away from the tone source, noting at all times the audible level through the MT-147C. The further away the operator moves from the tone source, the less power he will receive from the tone source, due to cable resistance or other faults or load coils.

3.09 The operator must know what kind of losses are to be anticipated by knowing cable type, splits, and load coil location. The operator can then overlook the audible level decrease.

3.10 If the audible level decreases, the operator may continue walking and obtain usable audible level by readjusting the volume controls.

3.11 If the audible tone decreases sharply or suddenly cannot be heard, the likelihood of finding the "broken down" fault is very great, since the tone cannot go beyond a short circuit.

3.12 If a wet section is found, the audible levels will decrease over several feet of cable instead as in paragraph 3.11, which is a pinpoint fault.

3.13 Sometimes, audible tone can be traced beyond a fault. This occurs in high resistance faults. A wet section can produce high to relatively low resistance faults, depending on the length and gauge of the wet section.

3.14 The above paragraph may be deemed "not broken down" and may subject to further analysis with a breakdown set.

3.15 Sometimes, two areas of cable have faults. Audible decreases in tones should be investigated, because a breakdown set may have broken down only one of the faults.

3.16 After the fault has been located, the tone source should be disconnected and the 91A restored to the carrying case.
CAUTION: Always disconnect the headset plug from the MT-147C after use. This disconnects the batteries in the MT-147C from the circuitry and prevents premature failure of batteries.

3.17 The MT-147C should be carried upside down during rainy weather to prevent rain from entering the jack openings.

4. OPERATION WITH MT-513A PROBE

4.01 WIRE TRACING: The intended use of the MT-513A probe is for indentifying wires in a cable WITHOUT metallic contact. The typical arrangement of equipment is similar to paragraphs 3.04 through 3.09, except that the MT-513A probe is placed into the input jack of the MT-147C and the MT-147C mode switch is in "probe".

4.02 When tone is applied to appropriate wires, the MT-91A can pick up audible levels as the probe is placed closer to the wire with the tone on it. The probe will react with the loudest level of tone when it is placed on the insulation of the wire with tone and not as loudly on others. Thus, as a means of wire identity becomes apparent. (See Fig. 4)

METRO TEL CORP. 15 BURKE LANE SYOSSET, NEW YORK 11791 Telephone 516-364-3377

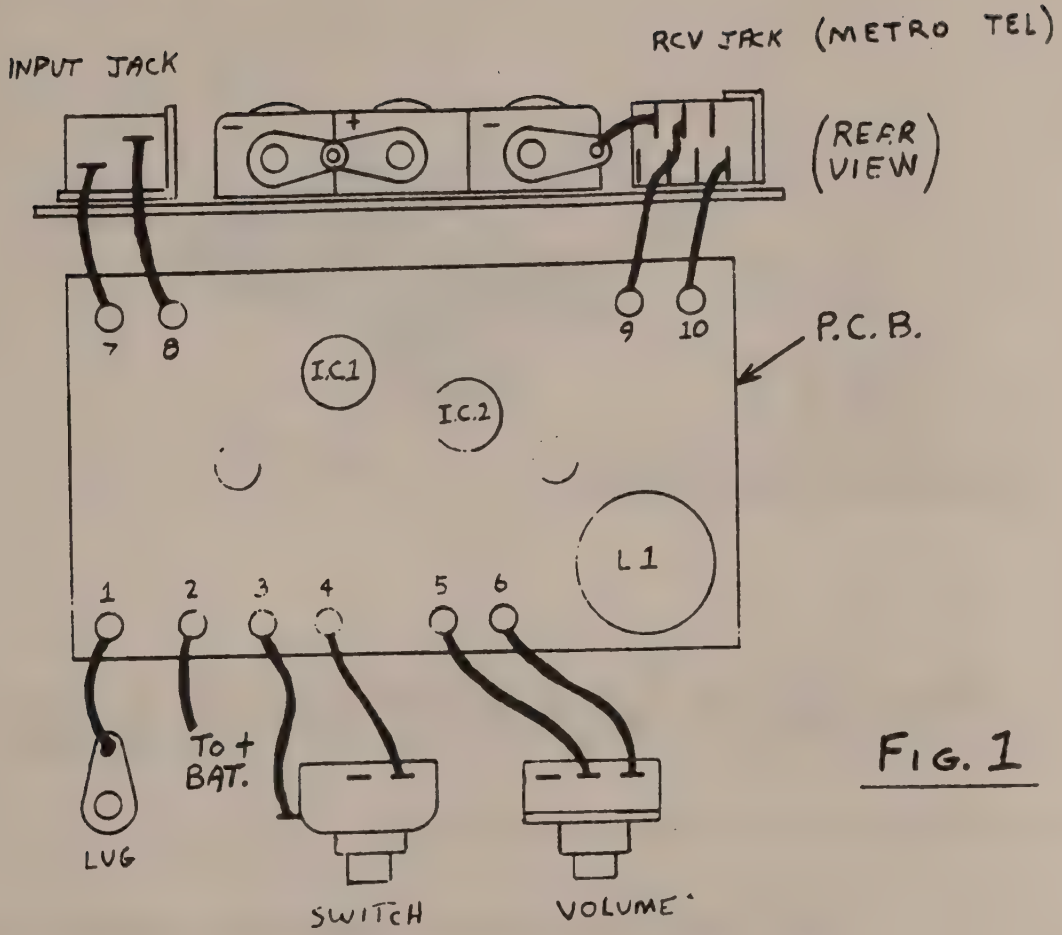


FIG. 1

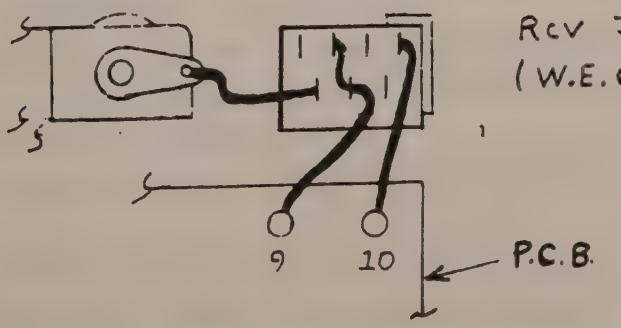


FIG. 2

CONVERT THIS

(A WORN OUT 147 AMPLIFIER)

TO THIS

(A FREQUENCY TUNABLE, SUPER LO NOISE AMPLIFIER)

Harry

FOR LESS THAN 100^{00}*

WITH THIS MODIFIED AMPLIFIER YOU WILL BE ABLE TO:

- Tune to the exact frequency of the tone generator you are using.
- Greatly reduce power influence noise.
- Get more than ten times the output level (compared to a 147B or 147C).
- Use lower output power tone generators in places where high level generators would cause cross-talk problems.
- Work at greater distances from the tone source.

---

*$99.75 — Including all parts and labor. The amplifier is returned to you modified, calibrated, and with a full one year warranty.

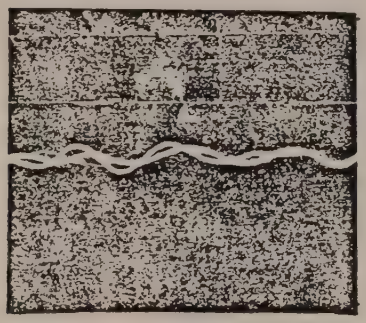
being incorporated into Telco Systems, high power tone generators are being removed from service because of the cross-talk problems they cause.

If you are having difficulties shooting troubles with a lower power tone generator, the problem is probably not the generator but the amplifier you are using.

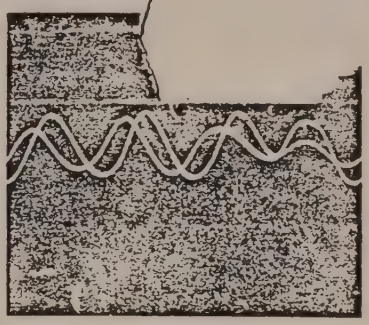
most rugged and dependable pieces of test equipment ever used, but it was not designed to have the filtering capability, bandwidth, or gain that is required to work effectively with the newer tone generators.

- Send us your worn-out amplifiers (all we need are the two jacks, front plate, and cover) and we will return to you a tunable amplifier with all the endurability of the old 147.

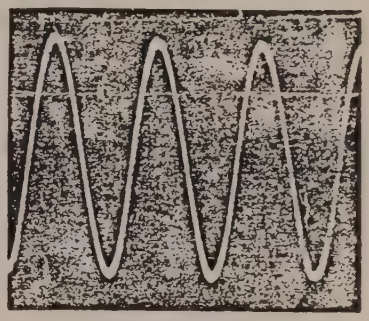
The following waveforms are actual photographs of the amplifiers' outputs across a headphone load of 600 ohms. A tone source was connected to a pair of wires with power influence noise superimposed and a 101 coil employed as the pick-up transducer. Th[illegible]ncy was 580HZ.



147B
The tone is all but lost in the power influence hash.

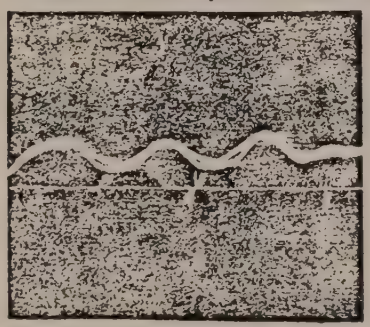


147C
An Improvement, But Still Very Noisy

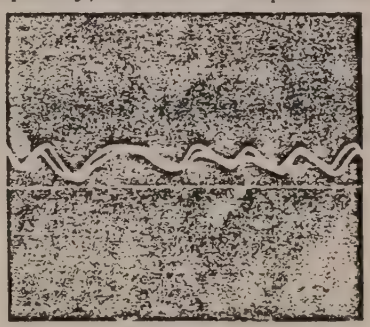


PSE MODIFIED AMP
Plenty Of Tone, Very Little Noise

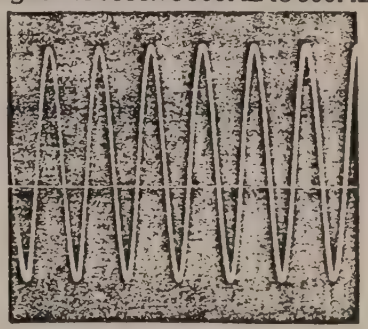
The same procedure was used to obtain the following waveforms, but the power influence noise source was removed and the frequency of the tone source changed to 1000HZ. These waveforms are indicative of the incompatibility of the newer types of tone generators and the standard 147B or 147C. Virtually all of the latest tone generators operate near this frequency, but the 147 amplifier was designed to receive 500HZ to 600HZ.



147B
No 1000HZ Here



147C
Very Little Here



PSE MODIFIED AMP
Plenty Of Tone Output

SPECIFICATIONS

- Max overall gain = 102DB.
- Frequency tuning range = 450HZ to 3800HZ in two bands (450HZ to 1300HZ and 900HZ to 3800HZ).
- Uses two EV#216 batteries.

WARRANTY

All 147 amplifiers modified to the tunable type by Parkway Systems Engineering are guaranteed to be free of defects in parts or workmanship for one year after completion of the modification, as long as the amplifier has not been further modified or abused beyond the normal wear and tear of everyday use. No other warranty is expressed or implied.

PSE
PARKWAY SYSTEMS ENGINEERING
1301 HIGHWAY 80 • CLINTON, MISSISSIPPI 39056
TELEPHONE (601) 924-2401

FIELD PROVEN*

And Still Only $99.75

This Tunable Modification Saves You Money Four Ways:

1. A proven time saver. On rural or noisy lines you can plan on cutting your fault locating time by at least 10% or more. On pair identification it is even better.

2. A savings of $100-$200 on the initial investment. (Compared to a new Amp purchase)

3. The TAX advantages realized by repairing existing equipment instead of buying new.

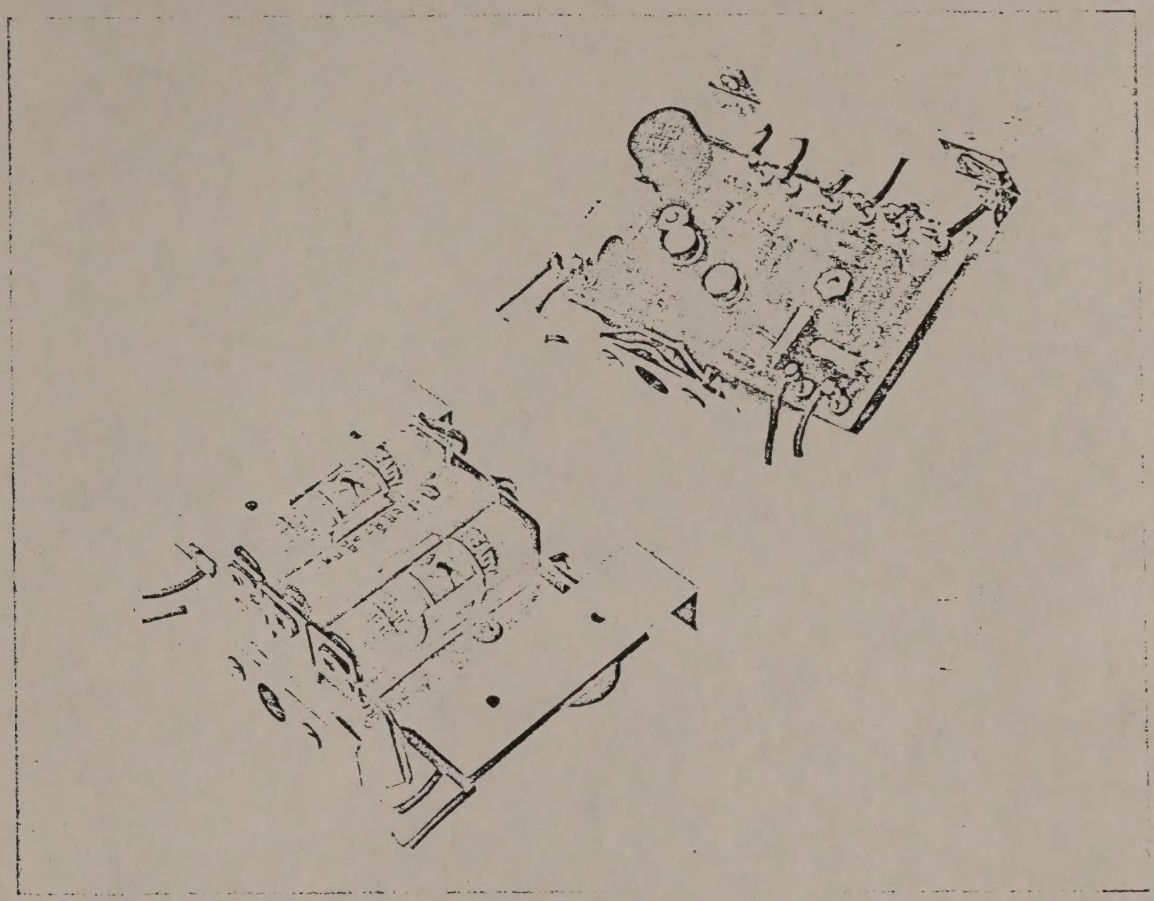
4. A warranty with guts. If it breaks within the 12 month period we will fix it free. NO parts charges- NO labor charges- NO shipping charges- FREE.

***Of total sales of 1120 units over a three year period, 966 were re-orders, and to date only 18 have been returned for repair. (Due to our one year, no-strings warranty, our own protection requires that we take extra measures to ensure durability.)**

SEE OTHER SIDE FOR SHIPPING INFORMATON

TEST EQUIPMENT

MODEL 1023 SOLID STATE AMPLIFIER KIT FOR 147 TYPE AMPLIFIERS



MODEL 1023 AMPLIFIER KIT

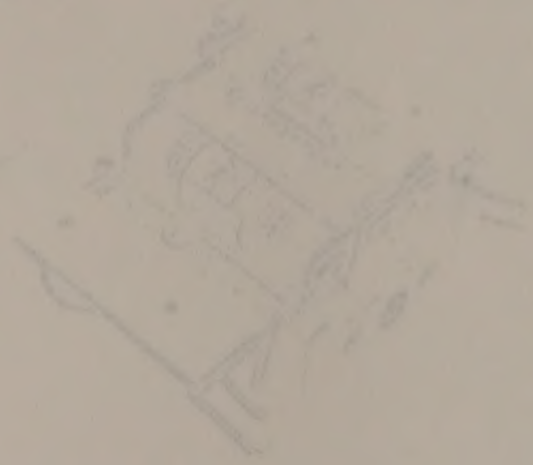
The Model 1023 is a solid state conversion kit designed to up-date all 147 type amplifiers to the current Model MT 147C. Conversions can be made in the field by following step by step instructions. This new circuit incorporates modern integrated circuitry for lower battery drain and increased sensitivity and removes the troublesome electron tubes and transformers.

FEATURES:

1. Three 1½ volt (#1015) batteries for a total battery life of 6000 hrs.
2. Replaces old loose molded battery holders and contacts with solid steel spring holders to withstand shock and vibration.
3. Incorporates a center frequency of 540 Hz for use with old and new detection frequencies (500 or 577Hz).
4. Improved band width response for elimination of outside interference.
5. Increased sensitivity for better fault detection.
6. Increased loudness for noisy locations.
7. Intergrated circuits provide low voltage, low current consumption.
8. Converts all model 147B amplifiers, (WE Co, Northern Electric or Metro Tel).

CAUTION
CHANGES HAVE BEEN MADE
ON THIS PAGE.
SEE ISSUE SHEET. 11/04/14

Metro Tel Corp.
15 BURKE LANE, SYOSSET, NEW YORK 11791 • (516) 364-3377



85140

Amberg®
ESSELTE
55802
MADE IN U.S.A.
0 78787 55802 4